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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,828	07/25/2003	Masahiro Fujii	1089.0490000/ALF	8717

26111 7590 11/13/2006

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EXAMINER	
HYUN, PAUL SANG HWA	
ART UNIT	**PAPER NUMBER**
1743	

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/626,828	FUJII ET AL.	
	Examiner	Art Unit	
	Paul S. Hyun	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10 and 13-27* is/are pending in the application.

4a) Of the above claim(s) *3,4,7,13-17,23 and 24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,6,8-10,18-22 and 25-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

REMARKS

Claims 1-10 and 13-27 are pending. Claims 3, 4, 7, 13-17, 23 and 24 have been withdrawn as being drawn to non-elected inventions. However, the withdrawn claims are subject to rejoinder if the generic claims are deemed allowable. Claims 1, 2 and 25 were amended. The amendments to claims 1 and 25 have changed the scope of claims 1 and 25 as well as the claims dependent on claims 1 and 25.

The amended Abstract submitted by Applicants has been acknowledged. The objection to the Abstract cited in the previous Office action has been withdrawn.

Amendment to claim 2 has overcome the claim objection cited in the previous Office action. Therefore, the claim objection has been withdrawn.

The claim rejection under 35 U.S.C. 112 1st paragraph cited in the previous Office action has been withdrawn in light of the cancellation of the rejected claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims **1, 2, 8-10, 20-22, 25 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (US 5,563,634) in view of Hayes et al. (US 4,877,745), Watanabe (US 4,484,199) and Purcell et al. (US 6,347,857 B1).

Fujii et al. disclose a piezoelectric ink jet head drive apparatus comprising an electrode substrate 2 having a plurality of electrodes 21 formed in correspondence with a plurality of pressurized chambers 6 bounded by a diaphragm 5 and a chamber substrate 1 that faces the electrode substrate 2. The apparatus further comprises a drive circuit 102 for applying a voltage between the diaphragm and the electrodes in order to discharge ink from the nozzle 4 of the ink jet head (see Fig. 2).

The apparatus disclosed by Fujii et al. differs from the claimed invention in that the reference does not disclose a drive current detection means, a discrimination means for detecting a defective discharge, or a control means for replacing the defective nozzle with a functional nozzle. The reference also does not disclose that the apparatus discharges biological samples.

In regards to the discharging of biological solutions, it is well-known in the art to dispense biological samples (i.e. protein and nucleic acid) using a jet head apparatus to form microarrays. Hayes et al. disclose a piezoelectric dispenser comprising a plurality of jetting heads 400 adapted to dispense biological solutions to form a microarray (see claim 4).

In light of the teachings of Hayes et al., it would have been obvious to one of ordinary skill in the art to provide and dispense biological solutions to form microarrays using the apparatus disclosed by Fujii et al.

In regards to the drive current detection circuit and the discrimination means, Watanabe discloses a discrimination means for detecting defective discharge of nozzles of piezoelectric ink-jet recording devices. The discrimination means comprises a driving

circuit that applies a drive voltage having a prescribed waveform to the piezoelectric nozzle, and a detection circuit for detecting the waveform of the current when an ink droplet is discharged. The discrimination means detects a defective discharge by comparing the detected waveform to the waveform of a successful discharge (see line 57, col. 3- line 9, col. 4).

In light of the teachings of Watanabe, it would have been obvious to one of ordinary skill in the art to provide the modified Fujii et al. apparatus with a detection circuit to analyze the waveform of the current flowing through each jetting head in order to detect any malfunctioning jetting head. Although the discrimination means disclosed by Watanabe detects voltage waveform instead of current waveform, given that voltage and current are positively correlated, it is inherent that the discrimination means is indirectly detecting current as well.

In regards to the control means, Purcell et al. disclose a piezoelectric dispensing device comprising a plurality of jet heads, a discrimination means for discriminating the existence of a defective jet head, and a control means for performing a discharge using a functional jet head in place of the defective jet head (see lines 54-62, col. 2).

In light of the teachings of Purcell et al., it would have been obvious to one of ordinary skill in the art to provide the modified Fujii et al. apparatus with a control means that replaces a defective nozzle with a fully functional nozzle so that the dispensing is not impaired by a malfunctioning jet head.

Claims **5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Ward et al. (US 6,640,621 B2).

Neither Fujii et al., Hayes et al., Watanabe nor Purcell et al. disclose a discrimination means that detects the existence of a defective discharge based on a differential waveform of the drive current.

Ward et al. disclose a sensor that analyzes differential waveforms of signals to identify defective signals. The reference discloses that the derivative of a waveform can indicate significant deviations from a normal signal (see lines 58-60, col. 1 and lines 7-9, col. 35).

In light of the teachings of Ward et al., it would have been obvious to one of ordinary skill in the art to provide a means that differentiates the waveforms produced by the nozzles of the modified Fujii et al. apparatus in order to easily identify the abnormal waveforms produced by a defective nozzle.

In regards to claim 6, it appears that any differential waveform that deviates from a normal differential waveform can be considered an indication of a defective nozzle. Although the references do not disclose a discrimination means that indicates the existence of a defective discharge based on a peak waveform appearing on the positive side two consecutive times, it would have been obvious to one of ordinary skill in the art to provide a discrimination means that indicates a defective nozzle when it detects a differential waveform signal that deviates from the normal differential waveform signal, including a differential waveform signal comprising consecutive positive peak values.

Claims **18 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Terasawa (US 4,631,554).

Neither Fujii et al, Hayes et al., Watanabe nor Purcell et al. disclose a recovery means comprising a suction that removes the solution to be dispensed from the nozzle.

Terasawa discloses an ink jet printing apparatus comprising a suction recovery unit (see lines 20-65, col. 2). The recovery unit comprises a suction pump 7 adapted to draw bubbles, excess ink and excess air from the nozzle of the apparatus in order to recover the defective nozzles to a functional state.

In light of the teachings of Terasawa, it would have been obvious to one of ordinary skill in the art to provide a suction to the modified Fujii et al. apparatus so that excess fluid and bubbles can be removed from the defective nozzles of the apparatus.

Claim **27** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al., Watanabe and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Wagner et al. (US 6,329,209 B1).

Neither Fujii et al., Hayes et al., Watanabe nor Purcell et al. disclose dispensing protein solutions on a substrate to form a protein chip.

Wagner et al. disclose a method of forming protein chips using ink-jet printer heads (see lines 10-35, col. 23).

In light of the teachings of Wagner et al., it would have been obvious to one of ordinary skill in the art to form protein chips useful for assays using the modified Fujii et al. device.

Response to Arguments

Applicants' arguments with respect to claims 1 and 18-21 have been considered but are moot in view of the new grounds of rejection. The amendments to claim 1 changed the scope of claim 1 and all the claims dependent on claim 1. The amendments necessitated new grounds of rejection.

Applicants' arguments with respect to claims 2, 8-10, 22, 25 and 26 have been fully considered but they are not persuasive.

Applicants' main argument appears to be predicated on implying that the limitation "when" recited in the claims is synonymous with the word "simultaneously" or "at the same time as". However, the word "when" can also mean "as soon as" (see www.dictionary.com). Applicants' interpretation of "when" within the context of the claims is not reasonable or supported by the Specification because the detection of the drive current cannot occur at the same time that the drive current is being applied. The current must be applied **before** it can be detected. Likewise, the determination of a defective discharge cannot occur at the same time that the drive current is detected. The current must be applied before an analysis of the current is conducted. Therefore, the limitation "when" was interpreted to mean "as soon as".

If the limitation "when" is interpreted to mean "as soon as", then Applicants' argument with respect to the cited references, especially Watanabe, is not persuasive. The detection means disclosed by Watanabe detects the drive current applied to the discharge means as soon as the drive current is applied. The combination of Fujii et al., Hayes et al., Watanabe, and Purcell et al. disclose all the limitations of claims 2, 8-10, 22, 25 and 26.

Conclusion

Applicant's amendment necessitated the new grounds of rejections presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul S. Hyun whose telephone number is (571)-272-8559. The examiner can normally be reached on Monday-Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PSH
11/8/06

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